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<i>Biochemical Fossils</i> : PROFESSOR DENIS L. FOX	111	<i>Special Articles</i> :	
<i>Modern Evidences for Differential Movement of Certain Points on the Earth's Surface</i> : DR. HARLAN T. STETSON	113	<i>Antibiotins</i> : DR. KARL DITTMER and PROFESSOR VINCENT DU VIGNEAUD. <i>Germination of Lettuce Seed at High Temperature Stimulated by Thiourea</i> : DR. ROSS C. THOMPSON. <i>The Excretion of Penicillin in the Spinal Fluid in Meningitis</i> : DR. DAVID H. ROSENBERG and J. C. SYLVESTER	129
<i>Obituary</i> : <i>Ronald Fraser MacLennan</i> : PROFESSOR ROBERT A. BUDINGTON. <i>Recent Deaths</i>	117	<i>Scientific Apparatus and Laboratory Methods</i> : <i>The Golden Hamster (Cricetus Auratus) As a Test Animal for the Diagnosis of Leptospirosis</i> : COLONEL RAYMOND RANDALL and CAPTAIN HAROLD K. COOPER	133
<i>Scientific Events</i> : <i>The Kresge-Hooker Scientific Library; The National Electronics Conference; A Harvey W. Wiley Memorial Symposium; Honorary Degrees to be Conferred by the University of Algiers; Award to the National Academy of Sciences</i>	118	<i>Science News</i>	10
<i>Scientific Notes and News</i>	120		
<i>Discussion</i> : <i>The Histological Changes in the Pituitary Caused by Estrogen</i> : DR. ISOLDE T. ZECKWER. <i>G. J. Romanes on the Excitability of Muscle</i> : DR. H. J. RALSTON. <i>The Generic Name of the Sand Fly</i> : WILLIAM F. RAPP, JR. <i>A Survey of Food Prices</i> : PROFESSOR J. MURRAY LUCK	123		
<i>Scientific Books</i> : <i>North American Fossils</i> : PROFESSOR PERCY E. RAYMOND. <i>Vegetable Fats and Oils</i> : DR. HERBERT E. LONGENECKER	125		
<i>Scientific Men Receiving Stars in the Seventh Edition of American Men of Science</i> : JAQUES CATTELL	126		

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BIOCHEMICAL FOSSILS¹

By Professor DENIS L. FOX

SCRIPPS INSTITUTION OF OCEANOGRAPHY

RECENT studies in this laboratory, to be reported in some detail elsewhere, have been concerned with preliminary qualitative and quantitative examinations of carotenoid pigments encountered in marine sediments of hundreds or thousands of years' standing. The preservation of a class of ordinarily highly labile compounds over vast ages of time is less surprising when one considers the special conditions which prevail in the buried strata of the ocean floor, *i.e.*, lack of free oxygen, absence of light and perpetual temperatures of nearly 0° C. The added facts that carotenoids as a class are absorbed in the digestive tract of most animals only at low levels of efficiency, and that they are relatively refractory toward non-oxidative biochemical changes would still further favor their gradual accumulation in the ocean floor.

¹ Contributions from the Scripps Institution of Oceanography, New Series No. 232.

Pigmentary compounds of the plant and animal porphyrin series have been encountered in petroleum, coal and shale oils.^{2,3} Similarly, other chlorophyll derivatives, accompanied by carotenoids, and sometimes also in association with fluorescent pigments common to petroleum, occur in long and deeply buried marine sediments.^{4,5} These ancient biochromic compounds, together with other oil-soluble substances in whose presence they occur, may be regarded as diagnostic features in the search for biochemical processes in the origins of petroleum and allied natural deposits.

Carotenoids have been reported in moor soils⁶ and

² R. Lemberg, *Ann. Rev. Biochem.*, 7: 424, 1938.

³ A. Treibs, *Ann. d. Chem.*, 510: 42, 1934.

⁴ D. L. Fox, *Proc. Nat. Acad. Sci.*, 23: 295, 1936.

⁵ D. L. Fox and L. J. Anderson, *Proc. Nat. Acad. Sci.*, 27: 333, 1941. (N.B. The published data are in error (p. 335) by a misplaced decimal, thus appearing as 6.0, instead of the correct value of 0.6 mg per cent.)

⁶ O. Baudisch and H. v. Euler, *Arkiv. Kemi Mineral Geol.*, 11A, No. 21, 1934.

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